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REMARKS

This paper is responsive to the Final Office Action dated September 8, 2006. Applicants have not amended any of the claims. Claims 1, 2, 4-33, 35-71 and 74-85 remain pending.

As a preliminary matter, Applicants take issue with the Examiner's refusal to address the arguments advanced by Applicants to date. Applicants have pointed out several fundamental flaws with the primary reference (Wilford). However, on more than one occasion, rather than address the arguments advanced by Applicants with respect to these fundamental flaws of Wilford, the Examiner simply cites new secondary references in combination with Wilford, and indicates that Applicants' arguments are moot in view of the new grounds of rejection. The Examiner has continued to advance the same flawed arguments with respect to the primary Wilford reference, and has failed to even acknowledge Applicants arguments, much less explain how the interpretations of Wilford advanced by the Examiner could be justified.

Applicants' previous arguments regarding several differences between the pending claims and the primary Wilford reference are not moot in view of the new grounds of rejection. On the contrary, the same arguments apply insofar as Wilford is still being misinterpreted by the Examiner, and passages of Wilford are still being misquoted by the Examiner. Indeed, the purported "new grounds" of rejection appear to be nothing more than carbon copies of the previous rejections, with the newly cited Akahane reference being used as a secondary reference instead of the formerly cited Merrel reference (USPN 6,553,408).

All of the arguments advanced by Applicants in the previous response are fully applicable to the new rejections. These arguments clearly demonstrate that Wilford does not disclose or suggest the features attributed to this reference by the Examiner. The Examiner's failure to address such arguments are clearly improper, and have added substantial time, delay and cost to the prosecution of the current application.

As one example, in the Office Action, the Examiner again indicated that Wilford teaches a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. However, this is clearly not the case. Accordingly, for at least this fundamental reason, all pending rejections are clearly based on a misinterpretation of Wilford and must be withdrawn.

The newly cited Akahane reference also lacks any suggestion of a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. In Akahane, each interface card 400, 401 has its own dedicated packet forwarding card 407, 407. Neither of these dedicated packet forwarding cards in Akahane performs route lookups for packets received from at least two different interface cards. On the contrary, each packet forwarding card 407, 407 operates with respect to one and only one interface card 400 or 401.

Furthermore, notwithstanding these observations of Akahane, Applicants note that the Examiner's interpretations do not even consider these features of Akahane, but rely on the erroneous interpretations of Wilford that have been previously advanced by the Examiner and addressed by the Applicants on several occasions. In particular, the Examiner's interpretation of Wilford is based on the erroneous conclusion that Wilford teaches a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. However, this is clearly not the case, and this erroneous interpretation of Wilford has been refuted by Applicants on many occasions. Applicants respectfully request the Examiner's consideration of these arguments. To date, the Examiner has simply ignored the arguments, yet continued to cite the Wilford reference based on erroneous interpretations of this reference.

Indeed, even during Examiner Interviews, Applicants have explained that Wilford is fundamentally different than the features of claim 1 insofar as Wilford teaches a router architecture in which all the routing is performed by individual line cards. In contrast, the current pending claims require the routing functionality to be separate from the line cards (interface cards), such that a routing module performs routing of packets received from a network by several different interface cards. Claim 1 also requires that the routing module include a packet forwarding engine and an interface card concentrator module that integrated into a single unit separate from the interface cards.

Claim Rejection Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 1, 2, 4-14, 16-30, 32, 33, 35-45, 47-61, 63-71, 74-79, and 81-83 under 35 U.S.C. 103(a) as being unpatentable over Wilford (USPN 6,687,247) in view of Akahane (US 2006/0126644); and rejected claims 15, 31, 46, 62, 80, 84 and 85 under 35 U.S.C. 103(a) as being unpatentable over Wilford in view of Akahane and

Zadikian et al. (USPN 6,724,757). Again these rejections appear to be identical to the former rejections, except for the fact that the Examiner has replaced the formerly cited Merrel reference (USPN 6,553,408) with Akahane. The Examiner has yet to address the many differences between Wilford and the pending claims, which Applicants have explained on many occasions.

Applicants traverse the current rejections to the extent such rejections may be considered applicable to the claims as amended. The applied references fail to disclose or suggest the inventions defined by Applicants' claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

In the Office Action, the Examiner once again relied upon Wilford for many of the same erroneous conclusions advanced in previous Office Actions. The Examiner cited Akahane (instead of the Merrel reference) as teaching "removable" interface cards, and cited Zadikian reference as teaching a redundant router configuration. **However, all pending rejections remain improper insofar as the Examiner is still clearly misinterpreting Wilford with respect to Applicants' claim language.** Again, Applicants have explained these issues on many occasions, and the Examiner has still failed to reply or explain these misinterpretations of Wilford.

In the Office Action, the Examiner indicated that Wilford teaches a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. However, this is clearly not the case. Accordingly, for at least this fundamental reason, all pending rejections are clearly based on a misinterpretation of Wilford and must be withdrawn.

As explained previously on the record, and as discussed in detail in the Examiner Interview, Wilford does not disclose or suggest packet forwarding engine that performs route lookups for packets received from at least two different interface cards. Quite the contrary, in Wilford each individual line card includes its own local routing lookup circuit, and that local routing circuit only provides routing functions for packets of that respective line card. Even if the cards of Wilford were made to be removable, this would not remedy the deficiencies of Wilford with respect to the pending claims.

Like Wilford, the current claims require a router to make use of interface cards. However, unlike Wilford, the current claims require a routing module to be separate from the interface cards, and require the routing module to perform route lookups for packets received

from at least two different interface cards. Thus, whereas Wilford incorporates a routing circuit into each respective line card for performing local route lookups only for packets received by that particular line card, the current claims require Applicants' routing module to have a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. Nothing in Wilford suggests any element that performs route lookups for packets received from at least two different interface cards. Moreover, none of the other references (including the newly cited Akahane reference) overcome this deficiency of Wilford with respect to Applicants' claims. Accordingly, for at least this reason, all pending claims should be allowed.

More specifically, claim 1 requires a router module separate from the plurality of removable interface cards, and the router module includes a packet forwarding engine and an interface card concentrator. Claim 1 also requires that the interface card concentrator module communicates packets from at least two of the removable interface cards to the packet forwarding engine, and that that packet forwarding engine performs route lookups for the packets received from the two different interface cards by way of the interface card concentrator module, wherein the packet forwarding engine selects routes for the packets and forwards the packets back to the plurality of interface cards via the interface card concentrator module. Claim 1 further requires that the packet forwarding engine and the concentrator module are integrated into a single unit separate from the plurality of interface cards.

In contrast to the features of claim 1 and the Examiner's comments with respect to these features, the Wilford reference describes a distributed architecture in which routing functions are performed by each interface card (referred to by Wilford as "linecards"). In fact, Wilford specifically refers to its architecture of FIG. 1 as a "distributed routing scheme" in which "routing is performed immediately on packet receipt [from the network 1] in each linecard."[1]

Furthermore, Wilford states that the linecards consists of three main sections: the network physical interface, the layer 3 packet switching system, and the fabric interface.[2] According to the Wilford architecture, each linecard includes three components: (1) the physical medium

[1] Wilford at col. 2, ll. 29-31.
[2] Wilford at col. 4, ll. 49-50.

providing connectivity to the network, (2) routing lookup circuitry, and (3) an interface to switching fabric interconnecting the linecards.

Thus, Wilford describes each interface card as including includes its own, local route lookup circuit that is applied to packets as the packets are received from the network by that linecard. In other words, Wilford describes a routing architecture in which each interface card makes localized routing decisions only for packets received from a network by that same linecard. In this sense, Wilford describes the antithesis of a routing module that performs centralized routing functions for packets received from a network by two or more different removable interface cards, as required by Applicants' claims. The distributed routing architecture of Wilford is probably best illustrated in FIG. 1, reproduced below.

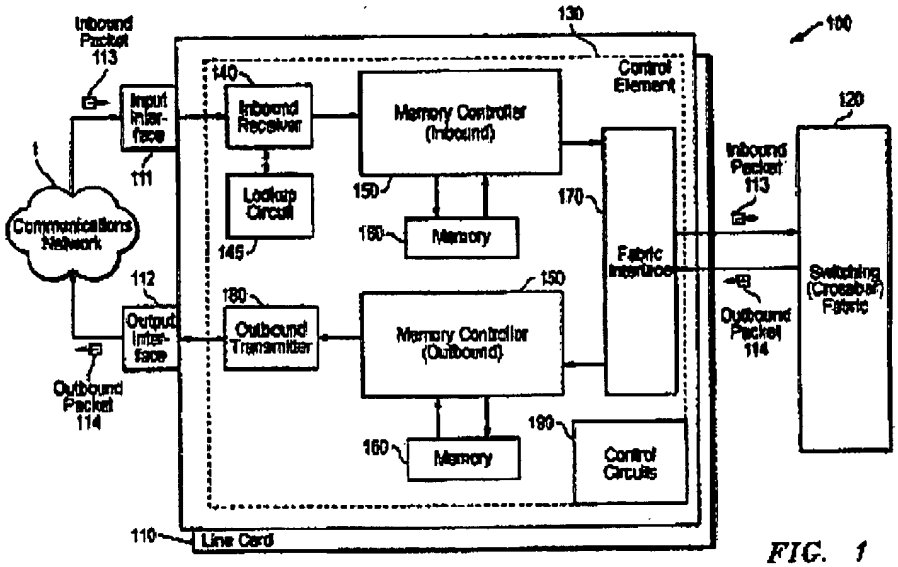

FIG. 1

As shown in FIG. 1 of Wilford, the Wilford router includes a plurality of linecards 110 (which is an interface card in the sense that it provides the physical medium for connecting the network as explained by Wilford). In Wilford, each linecard 110 specifically includes its own corresponding lookup circuit 145 that performs route lookup for packets 113 received from network 1 by that particular linecard. Each linecard 110 provides a physical interface 111, which is described as part of the linecard that provides physical connection to network 1.[3] Each linecard 110 further includes an inbound receiver 140 thereon for receiving the packets directly from communication

[3] Wilford at col. 4, ll. 53-55.

network 1. As clearly shown in FIG. 1 and as described in Wilford, lookup circuit 145 is only coupled to the inbound receiver 140, and the lookup circuit for each linecard performs route lookups only for the inbound packets received from the network 1. In other words, lookup circuit 145 does not perform route lookups for any packets received from any other linecard. As evidence of this point, Wilford states:

> In a manner well-known in the art, packets are received from the physical medium of the network at input interface 111. The inbound packet receiver 140 operates in conjunction with lookup circuit 145 to determine routing treatments for inbound packets 113.[4]

Similarly, with respect to the embodiment of FIG. 2, Wilford makes clear that inbound receiver 220 directs only a portion of inbound packets 113 to lookup circuit 225 for route lookup.[5]

After performing the route lookup, the lookup circuit of Wilford forwards the inbound packets to switch fabric interface 170 for outputting to the communication network 1 by any of the other linecards, without performing any further route lookups outside of the linecard. As illustrated by FIG. 1 and FIG. 2 of Wilford, and as made clear by the corresponding description in Wilford, route lookups are only applied to an inbound packets by the linecard 110 that received the packet from the network. No lookup circuit 145 performs route lookups for packets received by any other linecard 110.

Thus, contrary to the Examiner's comments in the final Office Action (and previous Office Actions), Wilford fails to teach or suggest a router module separate from the plurality of removable interface cards, which performs routing with respect to packet received from two or more of the interface cards. In contrast, Wilford makes abundantly clear that route lookup circuits 145 and 225 are distributed to each linecard 110, and that in the "distributed routing scheme" of Wilford routing is performed "immediately on packet receipt [from the network] in each linecard."[6] There simply is no router module in the Wilford architecture that is separate from a removable interface card.

In addition, Wilford also fails to suggest a router module having an interface card concentrator module that communicates packets from at least two different removable interface cards to the packet forwarding engine, and that the packet forwarding engine performs route

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[4] Wiflord at col. 1, ll. 58-67.
[5] Colford at col. 5, ll. 13-15.
[6] Wilford at col. 2, ll. 29-31.

lookups for the packets received from the at least two different ones of the plurality of interface cards by way of the interface card concentrator module to select routes for the packets and forwards the packets back to the plurality of interface cards via the interface card concentrator module.

Indeed, insofar at Wilford teaches a distributed in which routing functions are performed by each interface card, the notion of an interface card concentrator is completely at odds with Wilford. On this point, the Examiner argues that switch fabric 120 is a concentrator module and refers to FIG. 1. However, switch fabric 120 does not communicates packets from at least two different removable interface cards to a packet forwarding engine. Again, the packet forwarding functionality of Wilford is incorporated in line card 110, and therefore when a packet is sent to switch fabric 120 it already has its route destination. Consequently, switch fabric 120 is clearly not an interface card concentrator that communicates packets from at least two different removable interface cards to a packet forwarding engine.

Furthermore, Wilford fails to disclose or suggest a routing module in which a packet forwarding engine and a concentrator module are integrated into a single unit separate from the plurality of interface cards. On this point, the Examiner simply cites FIG. 1 of Wilford. However, as previously explained, Wilford describes a lookup circuit 145 that is in the line card and separate from switch fabric 120 (which the Examiner argues is an interface card concentrator). Thus, even if switch fabric 120 could be construed as an interface card concentrator (which Applicants dispute) this element is clearly not integrated into a single unit with lookup circuit 145. Thus, for this additional reason, the Examiner's interpretation of Wilford is flawed. Applicants also note that the Examiner later refers to element 120 as a midplane, in the analysis of claim 16. Thus, the Examiner seems to be referring to elements of Wilford as being two or more different components, which is improper.

With respect to dependent claim 2, Wilford does not describe a routing device in which a midplane is coupled between a plurality of interface cards and the router module and separates the plurality of removable interface cards from the router module. In rejecting claim 2, the Examiner refers to the fabric interface 170 of FIG. 1 as a midplane. However, the switch fabric interface 170 is provided on the linecards 110, along with lookup circuit 145. Thus, switch fabric 170 is not coupled between linecards 110 and route lookup circuit 145 at all. For this

same reason, switch fabric 170 does not separate the plurality of removable linecards 110 from the lookup circuit 145 as both of these elements are actually on the linecards.

With regard to dependent claim 11, Wilford fails to teach or suggest a packet forwarding module that selects routes lookups for the packets received from the at least two different ones of the plurality of interface cards by referencing a forwarding table, wherein the forwarding table stores route information for forwarding data packets received from any of the plurality of interface modules. As described above, FIG. 1 of Wilford makes clear that the lookup circuit 145 is only coupled to inbound receiver 140. Thus, the lookup circuit 145 performs routing functions only for packets received from the network by input interface 111 of that particular linecard. In other words, in Wilford, lookup circuit 145 does not process packets received from other linecards. Accordingly, no route lookup is performed at all for packets received from other linecards. Consequently, Wilford does not teach or suggest a packet forwarding engine that selects routes to forward packets using a forwarding table that stores route information for forwarding data packets received from any of the different interface modules, as required by claim 11.

All of the other independent claims should be allowed for at least the reasons advanced above with respect to independent claim 1. Each of the other independent claims are addressed briefly below.

Independent claim 16 requires a router module comprising a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module separate from a plurality of interface cards. Claim 16 specifically requires that the route lookup circuit be separate from a plurality of interface cards. Thus, claim 16 clearly distinguishes Wilford and the other applied references for essentially the same reasons advanced above with respect to claim 1.

Again, Wilford fails to teach or suggest a route lookup circuit integrated into a single module separate from a plurality of interface cards, as required by claim 16. Directly to the contrary, in Wilford, lookup circuits 145 and 225 are provided on a single card 110 along with interfaces 111 and 112.

Moreover, Wilford fails to teach or suggest a routing device in which the midplane communicates to the router module packets received from the network by at least two different ones of the interface cards, and wherein the central router module performs route lookups for the

packets received from the at least two different ones of the interface cards to select routes for the packets and forward the packets back to the interface cards in accordance with route information associated with the network. As discussed in detail above, Wilford makes it very clear that route lookup circuit 145 only performs route lookups for inbound packets 113 received from the network 1 and not for any packets received from any other linecards 110. Also, in the analysis of claim 16, the Examiner later refers to element 120 as a midplane, in direct conflict with the Examiner's other analysis, which refers to element 120 as a switch fabric.

With regard to dependent claim 24, Wilford fails to teach or suggest a packet forwarding module that selects routes for the packets received from the at least two different ones of the interface cards by referencing a forwarding table, wherein the forwarding table stores route information for forwarding data packets received from any of the plurality of interface cards. As described above, FIG. 1 of Wilford makes clear that the lookup circuit 145 is only coupled to inbound receiver 140 and only performs routing functions for packets received from the network by that particular linecard. Therefore, lookup circuit 145 does not perform route lookup for packets received from other linecards. For this reason, Wilford clearly does not teach or suggest a packet forwarding engine that selects routes to forward packets using a forwarding table that stores route information for forwarding data packets received from any of the different interface cards, as required by claim 24.

Independent claim 32 recites routing arrangement comprising a crossbar arrangement, and a plurality of routing devices coupled to the crossbar arrangement. At least one of the routing devices comprises a plurality of removable interface cards to communicate data packets using a network, and a router module separate from the plurality of interface cards. The router module performs route lookups for a first set of the data packets received from the network by a first one of the interface cards and for a second set of the data packets received from the network by a second one of the interface cards to select routes for the data packets and to forward the data packets between the interface cards, and the router module comprises a system control module that performs the route lookups and at least one concentrator module that receives the data packets from at least the first one and the second one of the removable interface cards. The system control module and the concentrator module are integrated into a single unit.

Independent claim 32 should also be allow for at least the reasons advance above with respect to claim 1. In particular, none of the applied prior art suggests a router module that performs route lookups for a first set of the data packets received from a network by a first interface card and for a second set of the data packets received from the network by a second interface card. Instead, Wilford describes line cards that each include there own lookup circuit. Furthermore, none of the applied prior art suggests a concentrator module, much less a concentrator module integrated with a system control module into a single unit.

Independent claim 47 recites a routing arrangement comprising a crossbar arrangement; and a plurality of routing devices coupled to the crossbar arrangement. At least one of the routing devices comprises a plurality of removable interface cards to communicate data packets using a network, a router module comprising a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module separate from the plurality of interface cards, and a midplane coupled to the router module and to the plurality of interface cards. The midplane communicates to the router module a first set of packets received from the network by a first one of the interface cards and a second set of packets received from the network by a different one of the interface cards, and the router module performs route lookups for the first set of packets and the second set of packets in accordance with route information associated with the network.

Claim 47 should also be allowed for at least those reasons advanced above, insofar as this claim recites a router module that performs route lookups for the first set of packets and the second set of packets in accordance with route information associated with the network. Claim 47 also recites the midplane, which is addressed above with respect to claim 16, and is also lacking from the teaching of Wilford, contrary to the Examiner's analysis.

Independent claim 63 recites a router comprising one hardware board integrally housing an interface concentrator that provides electrical interfaces to receive incoming packets from a plurality of interface cards, a packet processing circuit, a memory management circuit, and a route lookup circuit separate from the interface cards to perform route lookups to select routes for a first packet and a second of the incoming packets received from a network by different ones of the plurality of interface cards. Like the other claims, this claim requires a route lookup circuit

separate from the interface cards to perform route lookups for two or more interface cards, and should be allowed for at least this reason.

Independent claim71 recites a method of manufacturing a routing device, the method comprising providing a plurality of interface modules to communicate data packets using a network, coupling a midplane to the plurality of interface modules, and coupling a single router module to the midplane. Like many of the other claims, claim 71 also requires the router module to be configured to perform route lookups for data packets received from different ones of the interface modules via the midplane to select routes for the packets in accordance with route information associated with the network and forward the packets back to the interface modules by way of the midplane. In addition, claim 71 requires the router module to comprise a system control module and at least one concentrator module integrated into a single unit separate from the interface modules. For at least these reasons advanced above, claim 71 should also be allowed.

Claim 81 also recites a method of manufacturing a routing device. The method of claim 81 requires providing a plurality of interface cards to communicate data packets using a network, providing a routing module separate from the plurality of interface cards, and coupling the router module comprising a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module to the plurality of interface cards via a midplane. Claim 81 also requires the router module to be configured to perform route lookups for the data packets received from different ones of the plurality of interface cards to select routes for the packets in accordance with route information associated with the network and forward the packets back to the interface modules by way of the midplane. For reasons advanced above, this claim should also be allowed.

Claim 82 recites a method of manufacturing a routing arrangement. The method of claim 82 requires providing a crossbar arrangement, and coupling a plurality of routing devices to the crossbar arrangement. According to claim 81 at least one routing device comprises a plurality of interface cards to communicate data packets using a network, and a router module separate from the plurality of interface cards to process the data packets and to forward the data packets between the interface cards. Like many other claims, the router module recite in claim 82 is configured to perform route lookups for the data packets received from different ones of the

interface cards to select routes for the packets in accordance with route information associated with the network. Accordingly, this claim should also be allowed at this time.

Claim 83 also recites a method of manufacturing a routing arrangement. The method of claim 83 comprises providing a crossbar arrangement, and coupling a plurality of routing devices to the crossbar arrangement. According to claim 83, at least one routing device comprises a plurality of interface cards to communicate data packets using a network, a midplane coupled to the plurality of interface cards, a router module coupled to the midplane to receive the data packets from the midplane prior to route selection. The router module comprises a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module separate from the plurality of interface cards. Like many other claims, claim 83 requires the router module to be configured to perform route lookups for the data packets received from different ones of the interface cards to select routes for the packets in accordance with route information associated with the network and forward the packets back to the interface cards by way of the midplane.

Claim 84 recites a routing arrangement comprising a plurality of routing devices coupled in a crossbar arrangement. According to claim 84, at least one routing device comprises a plurality of interface modules to communicate data packets using a network, and a router module to receive the data packets from at least two different ones of the interface modules. Like many other claims, the router module of claim 84 is configured to perform route lookups for the data packets received from the at least two interface modules to select routes for the packets in accordance with route information associated with the network. The routing arrangement recited in claim 84 also requires a switch arrangement coupled to the plurality of routing devices and configured to switch control from a first routing device to a second routing device.

Claim 85 recites a routing arrangement comprising a plurality of routing devices coupled in a crossbar arrangement. According to claim 85, at least one routing device comprises a plurality of interface cards to communicate data packets using a network, a router module comprising a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module separate from the plurality of interface cards and a routing engine, and a midplane coupled to the router module and to the plurality of interface cards to provide data packets from the interface cards to the router module. The router module is configured to

perform route lookups for the data packets received from any of the interface cards to select routes for the packets in accordance with route information associated with the network and forward the packets back to the interface cards by way of the midplane. The routing arrangement recited in claim 85 also requires a switch arrangement coupled to the plurality of routing devices and configured to switch control from a first routing device to a second routing device.

Many of the distinctions outlined above also apply with respect to claims 84 and 85. Accordingly, these claims should also be allowed insofar as Wilford and the other applied references fail to disclose or suggest a router module configured to perform route lookups for data packets received from a plurality of interface cards, or a packet processing circuit, a memory management circuit, and a route lookup circuit integrated into a single module separate from the interface cards.

The newly cited Akahane reference also lacks any suggestion of a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. In Akahane, each interface card 400, 401 has its own dedicated packet forwarding card 407, 407. Neither of these dedicated packet forwarding cards in Akahane performs route lookups for packets received from at least two different interface cards. On the contrary, each packet forwarding card 407, 407 operates with respect to one and only one interface card 400 or 401.

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CONCLUSION

In conclusion, all claims in this application are in condition for allowance insofar as the Examiner has clearly misinterpreted Wilford in a number of respects. Wilford describes a distributed router arrangement in which individual line cards each include there own routing lookup circuit. In contrast, all of the pending claims require a routing module (or packet forwarding engine) that performs route lookups for packet received from different interface cards. In addition, many claims require an interface card concentrator that forward such packet from different interface cards to the routing module that performs the route lookups for packets received by the different, interface cards which is inapposite the Wilford arrangement. Furthermore, many claims require the interface card concentrator to be integrated into a common unit with the packet forwarding engine. Finally, many claims recite a midplane, which is also lacking from Wilford, contrary to the Examiner's analysis.

The foregoing comments primarily address the Wilford reference, and the Examiner's flawed interpretations of this reference. However, none of the secondary references provide any teaching that would overcome the deficiencies of Wilford discussed above. The Examiner relied on Akahane (instead of the formerly cited Merrel reference) solely for a teaching of "removable" interface cards, and relied on the Zadikian reference solely for a teaching of redundant router configuration. None of these references discloses or suggests a packet forwarding engine that performs route lookups for packets received from at least two different interface cards. Applicants reserve further comment on these references at this time.

The various dependent claims should be allowable for at least the reasons advanced above with respect to the independent claims. Moreover, other reasons also exist. Applicants do not acquiesce to any of the Examiner's rejections or characterizations of the prior art, and reserves the right to present additional arguments with respect to the independent or dependent claims.

Applicants respectfully request reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 50-1778. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

November 8, 2006

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